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Bridging Public-Private Partnership in Agricultural Biotechnology

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ABSTRACT:
Investment in agricultural biotechnology research by public sector off late has been significant but it is the synergy of cooperation and collaboration between public and private sector which will dictate the progress of R & D of a nation. Public-private partnership is therefore highly desirable to harness the benefits of biotechnology particularly in agriculture. The paper highlights some of the key features in fostering mutual public-private partnership where the roles and benefits of each partner are balanced and transparent.

Keywords: Agriculture biotechnology, IP protection, Partnership, R & D

INTRODUCTION

Among many uses of biotechnology, food and agriculture applications are unquestionably of particular interest to humankind including healthcare. Agricultural biotechnology research could have differential and dramatic impacts that could be employed to raise the crop yields.

Various organizations, private as well as public, currently engaged in agriculture biotech research can be broadly classified into five categories:

- largely global private sector companies such as Monsanto and others;
- public sector research organizations in National Agricultural Research Systems (NARS) including universities;
- International Agricultural Research Centres (IARCs) of the Consultative Group on International Agricultural Research (CGIAR);
- public research organizations including universities in industrialized countries; and
- various other international initiatives funded by donors and non-profit foundations of industrialized countries.

There is little doubt that globally, the private sector is the major player in biotechnological research. The past decade has seen a major increase in private sector investment in agricultural biotechnology, mostly in modern biotechnologies.

Private sector investment, however, has been focused mainly towards the development of input-intensive or other commodity oriented technology development because input-intensive technologies or products tend to be most profitable markets for industry. The private sector is unlikely to undertake much of the R & D needed by small farmers because it sees little potential for return on investment.

There has also been significant public sector investment in agricultural biotechnology research. Public investment in agricultural biotechnology is crucial for achieving future food security and reducing poverty.

Accelerated public investment is needed to develop biotechnological applications that address difficult problems related to agriculture in rain-fed and marginal areas. To achieve this, additional private and philanthropic resources are required because the public sector in developing countries has limited resources to finance such research.

Currently it is the private sector that has the knowledge, skills and capital to solve the problems of small farmers. Financial incentives or policy initiatives are essential for increased collaboration in biotechnology R & D between the public and private sectors.

Public-private sector co-funding of research initiatives can be a cost-efficient means for developing technologies for the benefit of poor farmers and general public in developing and under-developed countries, provided that the roles and benefits add to each partner and are balanced and transparent.

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COMPONENTS FOR PUBLIC-PRIVATE PARTNERSHIP

Any public-private partnership would need to have the following components:

1. Public R & D decisions and policy for each country
2. Strong proprietary rights and intellectual property protection
3. Public research and incentives for research
4. Expanding opportunities for partnership

1. Public R & D decisions

There is a unique and distinct role for public-sector research as the private sector's role expands. Public R & D decisions are likely to evolve slowly in comparison to the speed with which the biotechnology revolution is generating new knowledge of plant and animal genomics and stimulating development of genetically enhanced agricultural and agriculturally based products. The decision will rest on:

A. Public research policy
Decision makers need to identify strategies that will generate the greatest social return on R & D investments. Key to policy planning is determining when and how the public sector should interact with the private sector.

B. Focussed public-sector support
The current lack of focussed public sector support for pro-poor agri-biotechnological research will make it unlikely for the poor farmers to have access to such technologies in near future.

Hence, in many public sector research organisations there should be a demand-driven biotechnological research agenda especially in relation to the agronomic or socio-economic needs of poorer farmers. Public funding in such research should be increased.

2. Proprietary rights/ IP protection

A. Strong proprietary right
Strong IPR regime for biological inventions has weakened one of the historical justifications for public support of agricultural research i.e. the inability of private entities to sufficiently profit from research.

By the same token, another major justification to maximize knowledge spill-over by facilitating broad dissemination of research finding appears to have been reinforced.

B. Strengthening of intellectual property protection
Public research organizations should be pursuing intellectual property protection as vigorously as private firms. A strong public sector role in conducting a well funded research and pursuing IP protection will not only ensure a larger pool of R & D for the nation but also broad dissemination of new discoveries to other scientists and innovators who can advance and apply them.

3. Appropriate basic research and incentives

A. Basic research
By concentrating on basic research, the public sector can maximize spillovers to the benefit of further advancements in both public-and private-sector research, as long as the results of public-sector basic research remain non-appropriable public goods. Basic science can now lead to unique and patentable properties of specific biological materials.

B. Adequate incentives
Inadequate incentives and few financial packages for the scientists who have got themselves enriched with the knowledge and power of molecular and biotechnological tools to return to conduct research in their respective countries is still a distant dream.

In the absence of public sector funding for such scientists upon return, it is likely that many such scientists will become technology adapters and/or marketing agents for imported proprietary products/ germplasm developed by private and non-domestic companies. 'Brain drain' still jeopardises chances for many developing countries.

As and when such scientist return to situations where there is no or very little conventional plant breeding activity or infrastructure, the comparative advantage that they have learnt in plant biotechnology cannot easily be applied to the improvement of agriculture in their own countries. The 'Knowledge' acquired by them then becomes rust.

Therefore, incentives for private basic research offer an opportunity to redistribute limited public resources to critical areas in the public domain. For e.g., genetic resource conservation-storing and conserving genetic resources for the future-may be viewed as a kind of insurance against loss or rare biological material because it gives society the option of drawing upon theses banked resources at a later time.

4. Expanding opportunities for partnership

Cooperative Research and Development Agreement (CRADA), a mechanism used by US Department of Agriculture's Agricultural Research Service (ARS) could be a step for expanding opportunities for partnership. USDA has typically used CRADA's to speed the transfer of technology developed in the public sector for development of commercial applications. Other such collaborations may shift toward cooperative research projects or programs with multiple, complimentary outcomes for public and private participants.

WAY AHEAD

- Building an effective public-private partnership seems to be the definite way ahead and such partnerships will include;
- Outright donation of technology by private firms to national public research institutions;
- Institutional capacity building in biotechnology tools and IP; and
- Information and knowledge sharing.

Several mechanisms for accessing proprietary technologies by the public sector from the private sector and sometimes other public sector organizations are available. These include business and legal options to gain access to proprietary technologies such as confidential agreements, Material Transfer Agreements (MTRs), licensing, purchase, and joint ventures [1]. Up to now, there is limited experience in developing countries with these various types of agreements.

For any Public-private collaboration to be successful, it should include the following distinct features:

A. Unilaterally accessing technologies

One option for the public sector is to unilaterally access a tool or technology, especially those technologies that can be easily adopted. This is perfectly legal if the patent or any other form of IP protection for the technology has not been lodged in the country where the technology is to be used [2] and if the product is not exported to a country where there is a protection on the invention.

B. Purchasing the technology

Proprietary technologies can be bought by the public sector for use in developing countries. It then decides whether to make these materials public property or allow others to use the technology, subject to royalty payment. A variant of this approach would be to contract with the private sector, through competitive bidding, to develop a specific tool, but with public sector retaining ownership of the product. This is most appropriate where the know-how exists in the private sector to adapt a product to a specific situation with considerable certainty [2].

C. Material transfer and licensing agreements

Material Transfer Agreements (MTAs) are often used to define conditions for the transfer of research materials and tools for use in research only, leaving the need to develop a license for commercial use of final technologies to a later stage. Public research organizations favour MTAs that define "front-end decision" about priorities and resource contributions [3]. Upfront costs are minimal and risks are reduced because the negotiation for the use value occurs after the values of the product, if any, is known.

There is no denying the fact that the public sector is in a unique position to play a key role in biotechnological R & D in developing countries, but working alone will result in a slow progress. Therefore, public-private partnership is highly desirable for the developing countries to harness the benefits of biotechnology. A large investment by the private sector in biotechnology has clearly demonstrated the need for, and significant advantages associated with collaboration between the public and private sector in agriculture. The synergies of cooperation and collaboration between the public and private sector will result in the benefit of all parties involved, be it the private enterprise, public institutions, governments or the larger public in general.

The key points discussed in the paper are summarized below:

- The public sector organizations invest in agricultural research will be to maximize societal benefits and private firms need to earn profits in order to give good returns to their shareholders.

- Both public and private sectors need to have complementary assets, which are a magnet for collaboration. Public sector assets include germplasm, evaluation networks, expertise in breeding, familiarity with local growing conditions, access to seed delivery systems, relationships with extension organizations, and in case of International Agricultural Research Centers, reputation and goodwill that these institutions enjoy. Global life science companies

have assets in the form of biotechnology tools, genes, promoters, markers, technical know-how, financial resources, and skills in dealing with regulatory agencies.

- Formation of global public-private alliances and international agreements for tapping the current explosion in genomics knowledge to solve the problems of poor producers and consumers.

- Capacity in IP- The public sector has critical assets in the form of germplasm and associated biological knowledge important in new science of genomics. However to fully exploit these assets, public sector must develop a capacity in IP management, strengthen biosafety protocols and upgrade business skills.

- Market segmentation is likely to be a key element in public-private negotiations in the future. To ensure that public sector organizations in poor developing countries have access to proprietary technologies, multinational life science companies should have enlightened patent.

- Role of government will be to enhance cooperation with the private sector in the development of technologies that will benefit small farmers.

CONCLUSION

The goal of such private-public partnership is not to transform public sector institutions into private companies. The private sector is unlikely to replace the role of the public sector in research or in facilitating broad applications of biotechnology in developing countries [4]. Rather, the role of the public sector is vital, as the private sector is unlikely to deliver biotechnology applications for many crops grown by the poor farmers, orphan crops, and to address all biotic and abiotic production constraints relevant to agriculture in developing countries. It is the responsibility of the public sector to fill these gaps. Moreover, the public sector has a critical role in addressing broad policy issues, and guiding programs that optimise public benefits from technological innovations in agriculture.

New knowledge of biotechnology promises dramatic changes in the ability to enhance agricultural production and to develop food industry applications that benefit humanity and the natural environment. Some of this knowledge may result from private research organization, which may seek to restrict distribution to shield potential returns and some may be uncovered within the public domain. In either case, obtaining that knowledge requires expensive, long-term investments. New criteria are necessary for assessing where the public sector should invest, and how circumstances of industrial structure will affect expected returns to public investment. International leadership is needed to explore the establishment of an international fund to bid for key enabling technologies that are especially relevant to poor producers and consumers.

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